Course Syllabus

Jump to Today

No profession unleashes the spirit of innovation like computer science and engineering. Computer software runs the modern world. In the last week, what was the longest stretch of time you went without interacting with a computer in some way? Think of cell phones, cars, Google, Facebook, Twitter, eBay, Wikipedia, Roomba, World of Warcraft, Amazon, and NOAA's hurricane prediction, most of which are less than a decade old. Moreover, computation is now radically transforming the social sciences and humanities. Students will benefit by being able to apply computational thinking to their own study and research areas.

Course Goals

The objective of this course is not to turn you into an expert programmer. Rather, this course is designed to give you an overview of computer science and teach you about problem solving in a way that utilizes computation. Upon completion of this course, you will have a feel for how to think about and structure problems in such a way that you can use a computer to help you solve them. Programming is necessarily a part of this process, but it is neither the only part nor the most important part.

Modules

The course will be organized around the following main applications. You will then explore algorithms and implementations of computational solutions for those problems. These will introduce Python programming and computational problem solving throughout the course.

1. **Customizing House Plans:** Modeling the business of a home builder.
2. **Rock-Paper-Scissors-Lizard-Spock:** Playing a game from popular culture.
3. **Statistics:** Solving statistical problems.
4. **Mathematical Modeling:** Modeling and exploring the behavior of populations in a predator-prey relationship as represented by Lotka-Volterra equations.
5. **Text Analysis:** Analyzing statistical properties of natural language texts. Generating similar natural language text automatically via Markov models.
6. **Social Networks:** Building and measuring properties of social networks.
7. **Machine Learning:** Using neural nets to recognize LED patterns.

Grading

Your course grade will be broken down as follows:

1. **Attendance/participation** (10% total)

   You will be graded on class attendance and your participation in group activities.

2. **Quizzes** (10% total)

   There will be a short quiz before each class. You will have three attempts at each quiz (with no penalty). You will be able to see the explanations/hints immediately after you submit.

3. **Exams** (30% total — 15% each)

   There will be two exams.

4. **Assignments** (50% total — 5% each)

   There will be 10 assignments, roughly weekly.